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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/051,462 | 01/22/2002 | Hans-Gunter Hirsch | 4114-3 | 6967 |

7590

08/10/2005

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EXAMINER

LERNER, MARTIN

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/051,462

Applicant(s)

HIRSCH ET AL.

Examiner

Martin Lerner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 to 20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 to 20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. ____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. The drawings are objected to because they are informal. Figures 1 to 3 contain handwritten elements. Also, Figure 3 should include words matching references numerals as in Figures 1 and 2.
2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3 to 13, 15 to 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by *Takagi* ('057).

Regarding independent claims 1 and 15, *Takagi* ('057) discloses a speech recognition method, program code, and device compensating for background noise, comprising:

“providing a set of reference speech spectra” – reference pattern 3 is words or sentences of speech of a standard speaker that have been analyzed (column 5, lines 1 to 5: Figure 1);

“determining the reference speech spectral which correspond to the distorted short-term speech spectra” – an average value of the spectra of the noise regions of each of the input speech and the reference pattern is used; additive noise and channel distortion (“distorted short-term speech spectra”) of the input speech is matched with those of the reference pattern (column 6, lines 13 to 17: Figure 1); noise conditions of additive noise and channel distortion of recognized input speech and those of the reference pattern are matched (column 8, lines 34 to 46); a reference pattern is analyzed and matched to feature vectors of the input speech (column 5, lines 5 to 18); implicitly, feature vectors represent “short-term speech spectra” because feature vectors

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correspond to one frame of speech, which is the shortest time period for speech analysis;

“estimating a frequency response taking into account both the distorted short-term speech spectra and the corresponding reference speech spectra” – spectral transforming portion 4 transforms the time sequence $X(t)$ of the feature vectors of the input speech and the time sequence $Y(t)$ of the feature vectors of the reference pattern into time sequences $V(t)$ and $W(t)$ of spectra; cepstra are transformed into spectra (column 5, lines 18 to 30: Figure 1); spectra represent “a frequency response” because a spectrum of speech gives an amplitude for each speech frequency;

“compensating the distorted short-term speech spectra based on the estimated frequency response” – compensating portion 6 matches additive noise and channel distortion of the input speech with those of the reference pattern corresponding to Equations (11) and (13); compensation is performed by multiplying one of the reference pattern and the input speech by a predetermined channel distortion so that the average value of the speech pattern becomes equal to that of the input speech (column 8, lines 4 to 21: Figure 1); here, multiplying the input speech by a predetermined channel distortion provides for “compensating the distorted short-term speech spectra”; Equations (11) and (13) are stated to be spectra of speech regions, so compensation is “based on the estimated frequency response.”

Regarding independent claims 17 and 19, *Takagi* ('057) further discloses a database for storing reference speech spectra because reference patterns 3 are

implicitly stored in a database element, as illustrated (Figure 1); additionally, a processor implicitly performs the method steps of the flowchart (Figure 1).

Regarding claim 3, *Takagi* ('057) discloses compensating speech as a spectrum of the input speech and a reference pattern ("in the spectral domain").

Regarding claim 4, *Takagi* ('057) discloses that spectra of additive noise Bw and channel distortion Aw of a reference pattern are known (column 5, line 62 to column 6, line 12); spectra represent a frequency response, so the reference patterns are obtained "from speech data subject to a known frequency response".

Regarding claims 5 and 7, *Takagi* ('057) discloses that additive noise and channel distortion of input speech is matched to those of the reference pattern (column 6, lines 13 to 17); matching involves finding a closest reference pattern to input speech.

Regarding claim 6, *Takagi* ('057) discloses stored reference patterns 3 for speech recognition (column 5, lines 1 to 5: Figure 1); implicitly, reference patterns are known in the art as "models".

Regarding claims 8 and 13, *Takagi* ('057) discloses compensating a reference pattern by taking an average of input speech for regions of additive noise and channel distortion during preliminary matching 2 (column 6, lines 22 to 57: Figure 1).

Regarding claim 9, *Takagi* ('057) discloses matching input speech and reference patterns by a matching error (column 6, lines 8 to 12: Figure 1); a matching error represents a difference between input speech and a reference pattern.

Regarding claim 10, *Takagi* ('057) discloses average vector calculating portion 5 calculates the average vector of the time sequences of the spectra of the input speech (column 9, lines 3 to 8: Figure 1).

Regarding claims 11 and 12, *Takagi* ('057) discloses using average values of spectra of input speech and reference patterns (column 6, lines 13 to 17: Figure 1); an average is calculated by summing over previous samples K_{Ω} and K_{Φ} (column 6, lines 22 to 57); averaging over a number of past samples is equivalent to "smoothing".

Regarding claim 16, *Takagi* ('057) discloses a procedure described by a flowchart (Figure 1), which is implicitly performed on a digital signal processor, with a recording medium storing the instructions of the procedure.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2, 14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Takagi* ('057) in view of *Takahashi*.

Concerning independent claim 14, *Takagi* ('057) discloses all the limitations, but does not expressly provide for "obtaining distorted speech spectra and analyzing the distorted speech spectra by means of a speech/nonspeech decision to filter out the distorted speech spectra that do not contain speech." In fact, however, *Takagi* ('057)

discloses storing predetermined speech regions and noise regions of reference patterns (column 5, lines 6 to 9), and using average values of speech and noise regions of the input speech (column 6, lines 13 to 17). Thus, while *Takagi* ('057) does not expressly disclose a speech/nonspeech decision filter to filter out distorted speech spectra that do not contain speech, implicitly, there must be a speech/nonspeech detector to decide which regions are speech regions and which regions are noise regions. Those skilled in the art know that a voice activity detector (VAD) ("a speech/nonspeech decision filter") is a common element for making speech/nonspeech decisions for a variety of purposes in speech processing. Specifically, *Takahashi* teaches noise suppression for removing noise from voice, where a voice/nonvoice discriminator 32 judges whether a voice signal separated into frames is voice or non-voice. The objective is to estimate a noise spectrum during silent periods so as to subtract a noise spectrum from a distorted speech spectrum and thereby correct a distorted speech spectrum to eliminate noise (Column 7, Line 38 to Column 8, Line 11: Figure 4) It would have been obvious to one having ordinary skill in the art to analyze distorted speech with a speech/nonspeech decision as taught by *Takahashi* in the method of removing noise during speech recognition of *Takagi* ('057) for the purpose of estimating a noise spectrum during silent periods so that noise may be eliminated.

Concerning claim 2, similar considerations apply.

Concerning claim 18, *Takahashi* discloses first spectrum memory 36a and second spectrum memory 36b for temporarily storing prior frames of speech spectra

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(column 7, lines 51 to 61), which are equivalent to "a buffer", a common expedient implicit in speech processing.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Takagi* ('057) in view of *Brown et al.*

Takagi ('057) discloses all of the limitations, omitting only "a distributed speech recognition system" having "a network server with central speech recognition means." However, distributed speech recognition with a client/server architecture and central speech recognition on a server are commonly known because more computationally intensive speech recognition activities may be performed on a server to minimize the computational requirements of a client. Specifically, *Brown et al.* teaches an acoustic speech recognizer system and method, where a phone browser 12 connects to speech recognition server 34. (Column 2, Line 23 to Column 3, Line 8: Figures 1 and 2) *Brown et al.* states an advantage of a speech recognizer system that has a barge-in detector discriminating between speech and noise, and does not need a push-to-talk command. (Column 1, Lines 35 to 56) It would have been obvious to one having ordinary skill in the art to incorporate a speech recognition apparatus of *Takagi* ('057) into a distributed speech recognition system with a central speech recognition server as suggested by *Brown et al.* for the purpose of eliminating a need for a push-to-talk button.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Gong ('843), Hirayama, Gong ('842), Brückner et al., Boll et al., Porter, Ponting et al., Cerisara et al., and Yamaguchi et al. disclose related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (571) 272-7608. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

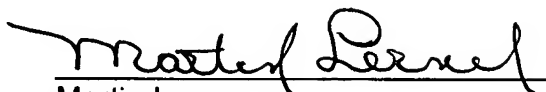
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ML
8/3/05

A handwritten signature in black ink, appearing to read "Martin Lerner", written over a horizontal line.

Martin Lerner
Examiner
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